8.6 AC Conducted Emissions

▣ **Test Requirements and limit, §15.207**

For an intentional radiator that is designed to be connected to the public utility (AC) power line, the radio frequency voltage that is conducted back onto the AC power line on any frequency or frequencies, within the band 150 kHz to 30 MHz, shall not exceed the limits in the following table, as measured using a 50 µH/50 ohms line impedance stabilization network (LISN).

Frequency Range (MHz)	Conducted Limit (dBuV)	
	Quasi-Peak	**Average**
0.15 ~ 0.5	66 to 56 *	56 to 46 *
0.5 ~ 5	56	46
5 ~ 30	60	50

* Decreases with the logarithm of the frequency

Compliance with this provision shall be based on the measurement of the radio frequency voltage between each power line (LINE and NEUTRAL) and ground at the power terminals.

▣ **Test Configuration**
See test photographs for the actual connections between EUT and support equipment.

▣ **Test Procedure**

Conducted emissions from the EUT were measured according to the ANSI C63.10-2013.

1. The test procedure is performed in a 6.5 m × 3.5 m × 3.5 m (L × W × H) shielded room. The EUT along with its peripherals were placed on a 1.0 m (W) × 1.5 m (L) and 0.8 m in height wooden table and the EUT was adjusted to maintain a 0.4 meter space from a vertical reference plane.

2. The EUT was connected to power mains through a line impedance stabilization network (LISN) which provides 50 ohm coupling impedance for measuring instrument and the chassis ground was bounded to the horizontal ground plane of shielded room.

3. All peripherals were connected to the second LISN and the chassis ground also bounded to the horizontal ground plane of shielded room.

4. The excess power cable between the EUT and the LISN was bundled. The power cables of peripherals were unbundled. All connecting cables of EUT and peripherals were moved to find the maximum emission.

▣ **Test Results: Comply**
Note 1: See next pages for actual measured spectrum plots and data for worst case result.

Dt&C

AC Line Conducted Emissions (Graph)

Test Mode: U-NII 1 & 802.11a & 5180 MHz

Results of Conducted Emission
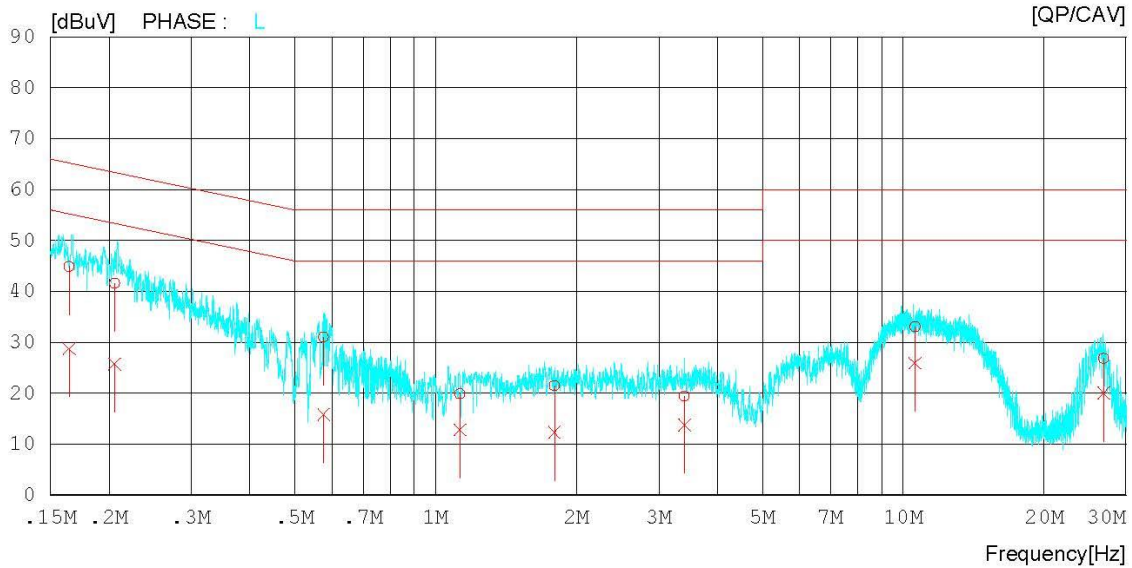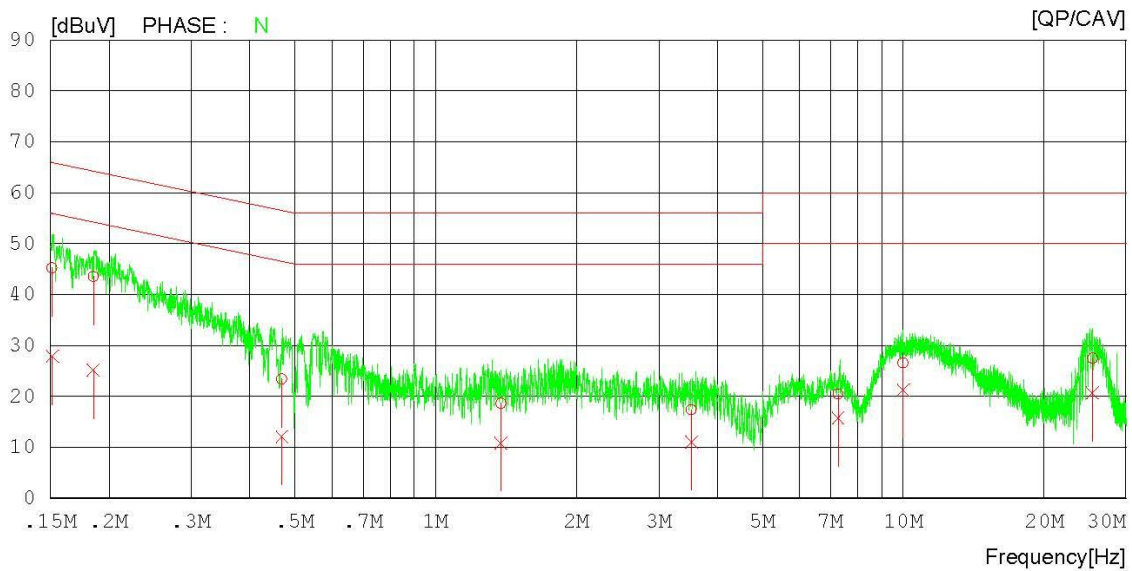
DTNC   Date 2020-01-17

Order No.			Referrence No.	
Model No.	LM-V601V		Power Supply	120 V, 60 Hz
Serial No.			Temp/Humi.	23 'C / 35 %
Test Condition	5.1G WLAN		Operator	J. W. Kim

Memo

LIMIT : FCC P15.207 QP
        FCC P15.207 AV

AC Line Conducted Emissions (Data List)

Test Mode: U-NII 1   &   802.11a   &   5180 MHz

Results of Conducted Emission

DTNC   Date 2020-01-17

Order No.   Referrence No.
Model No.   LM-V601V   Power Supply   120 V, 60 Hz
Serial No.   Temp/Humi.   23 'C / 35 %
Test Condition   5.1G WLAN   Operator   J. W. Kim

Memo

LIMIT : FCC P15.207 QP
        FCC P15.207 AV

NO	FREQ	READING QP	CAV	C.FACTOR	RESULT QP	CAV	LIMIT QP	CAV	MARGIN QP	CAV	PHASE
	[MHz]	[dBuV]	[dBuV]	[dB]	[dBuV]	[dBuV]	[dBuV]	[dBuV]	[dBuV]	[dBuV]	
1	0.15138	35.30	18.00	9.94	45.24	27.94	65.92	55.92	20.68	27.98	N
2	0.18501	33.60	15.18	9.94	43.54	25.12	64.26	54.26	20.72	29.14	N
3	0.46870	13.44	2.17	9.95	23.39	12.12	56.54	46.54	33.15	34.42	N
4	1.37889	8.60	0.90	9.99	18.59	10.89	56.00	46.00	37.41	35.11	N
5	3.52333	7.26	0.97	10.10	17.36	11.07	56.00	46.00	38.64	34.93	N
6	7.25467	10.21	5.54	10.23	20.44	15.77	60.00	50.00	39.56	34.23	N
7	9.99347	16.30	11.00	10.34	26.64	21.34	60.00	50.00	33.36	28.66	N
8	25.39677	16.89	10.06	10.66	27.55	20.72	60.00	50.00	32.45	29.28	N
9	0.16450	34.92	18.77	9.94	44.86	28.71	65.23	55.23	20.37	26.52	L
10	0.20589	31.62	15.75	9.94	41.56	25.69	63.37	53.37	21.81	27.68	L
11	0.57580	21.02	5.85	9.95	30.97	15.80	56.00	46.00	25.03	30.20	L
12	1.12668	9.91	2.81	9.97	19.88	12.78	56.00	46.00	36.12	33.22	L
13	1.79444	11.36	2.27	10.02	21.38	12.29	56.00	46.00	34.62	33.71	L
14	3.40695	9.34	3.62	10.08	19.42	13.70	56.00	46.00	36.58	32.30	L
15	10.59525	22.68	15.52	10.35	33.03	25.87	60.00	50.00	26.97	24.13	L
16	26.84084	16.10	9.33	10.66	26.76	19.99	60.00	50.00	33.24	30.01	L

AC Line Conducted Emissions (Graph)

Test Mode: U-NII 2A   &   802.11a   &   5320 MHz

Dt&C

AC Line Conducted Emissions (Data List)

Test Mode: U-NII 2A   &   802.11a   &   5320 MHz

Results of Conducted Emission

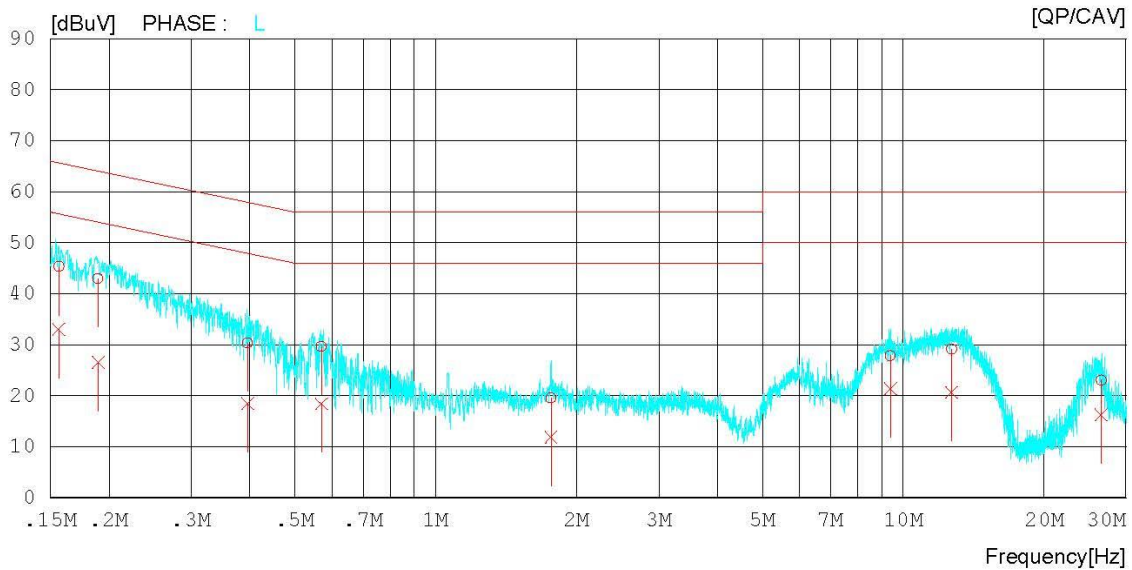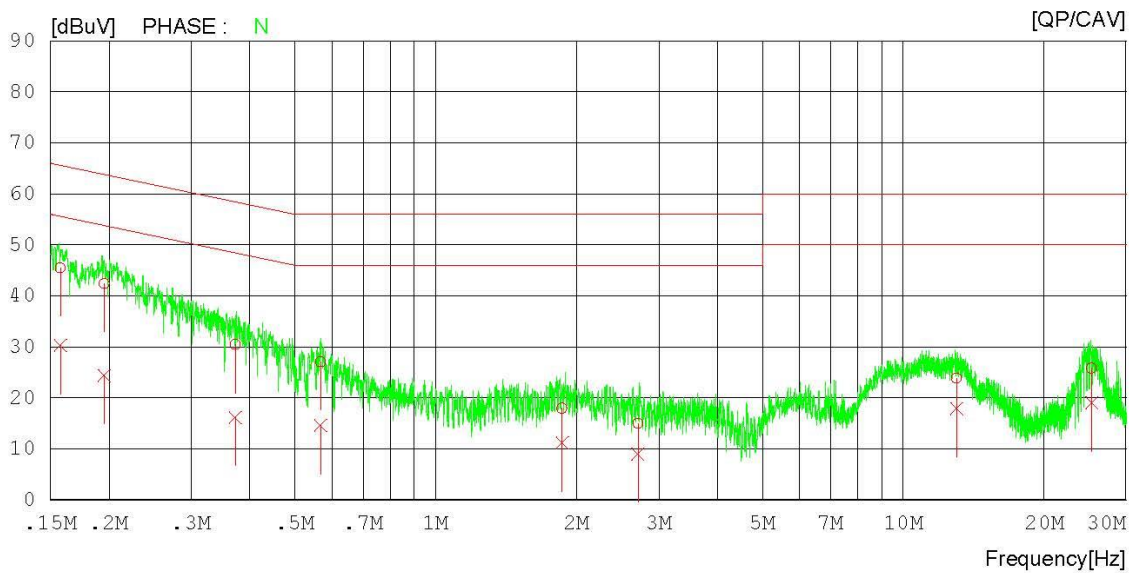DTNC   Date 2020-01-17

Order No.   Referrence No.
Model No.   LM-V601V   Power Supply   120 V, 60 Hz
Serial No.   Temp/Humi.   23 'C / 35 %
Test Condition   5.3G WLAN   Operator   J. W. Kim

Memo

LIMIT : FCC P15.207 QP
        FCC P15.207 AV

NO	FREQ	READING QP	CAV	C.FACTOR	RESULT QP	CAV	LIMIT QP	CAV	MARGIN QP	CAV	PHASE
	[MHz]	[dBuV]	[dBuV]	[dB]	[dBuV]	[dBuV]	[dBuV]	[dBuV]	[dBuV]	[dBuV]	
1	0.15750	35.54	20.38	9.94	45.48	30.32	65.59	55.59	20.11	25.27	N
2	0.19550	32.46	14.45	9.94	42.40	24.39	63.80	53.80	21.40	29.41	N
3	0.37309	20.45	6.19	9.95	30.40	16.14	58.43	48.43	28.03	32.29	N
4	0.56731	17.12	4.68	9.95	27.07	14.63	56.00	46.00	28.93	31.37	N
5	1.86319	7.89	1.14	10.03	17.92	11.17	56.00	46.00	38.08	34.83	N
6	2.70400	4.91	-1.00	10.05	14.96	9.05	56.00	46.00	41.04	36.95	N
7	12.99257	13.39	7.44	10.43	23.82	17.87	60.00	50.00	36.18	32.13	N
8	25.28302	15.12	8.39	10.66	25.78	19.05	60.00	50.00	34.22	30.95	N
9	0.15650	35.34	23.00	9.94	45.28	32.94	65.65	55.65	20.37	22.71	L
10	0.18961	33.02	16.58	9.94	42.96	26.52	64.05	54.05	21.09	27.53	L
11	0.39655	20.36	8.47	9.95	30.31	18.42	57.93	47.93	27.62	29.51	L
12	0.56979	19.65	8.42	9.95	29.60	18.37	56.00	46.00	26.40	27.63	L
13	1.76353	9.51	1.81	10.02	19.53	11.83	56.00	46.00	36.47	34.17	L
14	9.38608	17.48	11.09	10.32	27.80	21.41	60.00	50.00	32.20	28.59	L
15	12.67985	18.64	10.21	10.41	29.05	20.62	60.00	50.00	30.95	29.38	L
16	26.50059	12.39	5.57	10.66	23.05	16.23	60.00	50.00	36.95	33.77	L

AC Line Conducted Emissions (Graph)

Test Mode: U-NII 2C & 802.11a & 5500 MHz
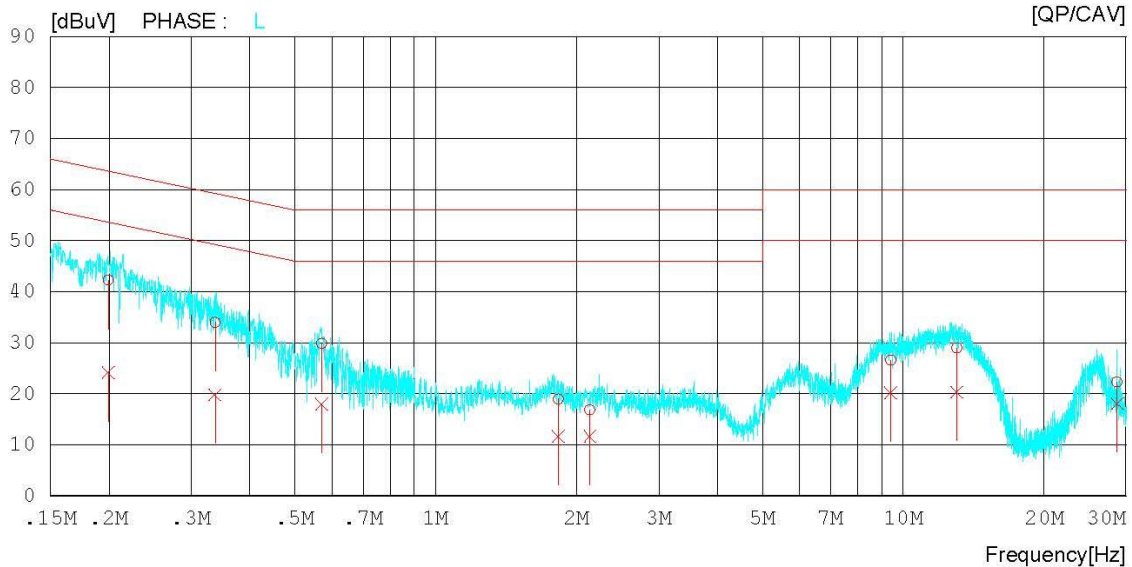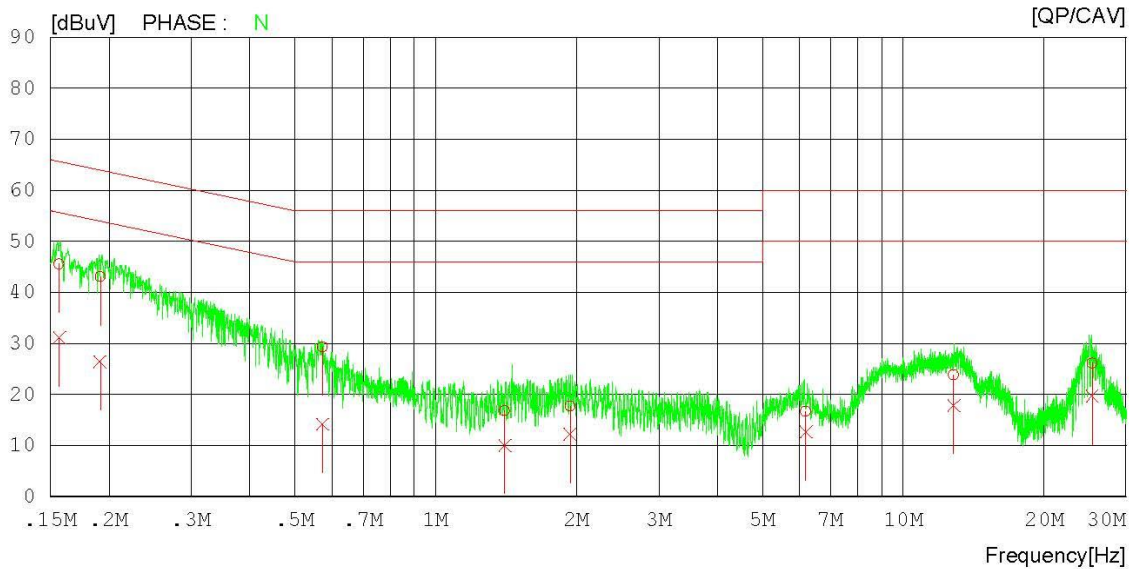
Results of Conducted Emission

DTNC   Date 2020-01-17

Order No.		Referrence No.	
Model No.	LM-V601V	Power Supply	120 V, 60 Hz
Serial No.		Temp/Humi.	23 'C / 35 %
Test Condition	5.5G WLAN	Operator	J. W. Kim

Memo

LIMIT : FCC P15.207 QP
        FCC P15.207 AV

Dt&C

AC Line Conducted Emissions (Data List)

Test Mode: U-NII 2C & 802.11a & 5500 MHz

Results of Conducted Emission

DTNC   Date 2020-01-17

Order No.   Referrence No.
Model No.   LM-V601V   Power Supply   120 V, 60 Hz
Serial No.   Temp/Humi.   23 'C / 35 %
Test Condition   5.5G WLAN   Operator   J. W. Kim

Memo

LIMIT : FCC P15.207 QP
        FCC P15.207 AV

NO	FREQ	READING QP	CAV	C.FACTOR	RESULT QP	CAV	LIMIT QP	CAV	MARGIN QP	CAV	PHASE
	[MHz]	[dBuV]	[dBuV]	[dB]	[dBuV]	[dBuV]	[dBuV]	[dBuV]	[dBuV]	[dBuV]	
1	0.15671	35.60	21.19	9.94	45.54	31.13	65.64	55.64	20.10	24.51	N
2	0.19165	33.09	16.45	9.94	43.03	26.39	63.96	53.96	20.93	27.57	N
3	0.57250	19.40	4.27	9.95	29.35	14.22	56.00	46.00	26.65	31.78	N
4	1.40519	6.88	0.03	9.99	16.87	10.02	56.00	46.00	39.13	35.98	N
5	1.93803	7.70	2.16	10.03	17.73	12.19	56.00	46.00	38.27	33.81	N
6	6.18865	6.44	2.44	10.20	16.64	12.64	60.00	50.00	43.36	37.36	N
7	12.81519	13.44	7.40	10.43	23.87	17.83	60.00	50.00	36.13	32.17	N
8	25.35233	15.50	9.02	10.66	26.16	19.68	60.00	50.00	33.84	30.32	N
9	0.19947	32.27	14.20	9.94	42.21	24.14	63.63	53.63	21.42	29.49	L
10	0.33715	24.03	9.78	9.94	33.97	19.72	59.27	49.27	25.30	29.55	L
11	0.57050	19.90	8.03	9.95	29.85	17.98	56.00	46.00	26.15	28.02	L
12	1.83034	8.92	1.57	10.02	18.94	11.59	56.00	46.00	37.06	34.41	L
13	2.13643	6.76	1.54	10.03	16.79	11.57	56.00	46.00	39.21	34.43	L
14	9.39460	16.21	9.80	10.32	26.53	20.12	60.00	50.00	33.47	29.88	L
15	13.01578	18.58	9.88	10.41	28.99	20.29	60.00	50.00	31.01	29.71	L
16	28.68521	11.52	7.33	10.70	22.22	18.03	60.00	50.00	37.78	31.97	L

Dt&C

AC Line Conducted Emissions (Graph)

Test Mode: U-NII 3 & 802.11a & 5785 MHz

Results of Conducted Emission

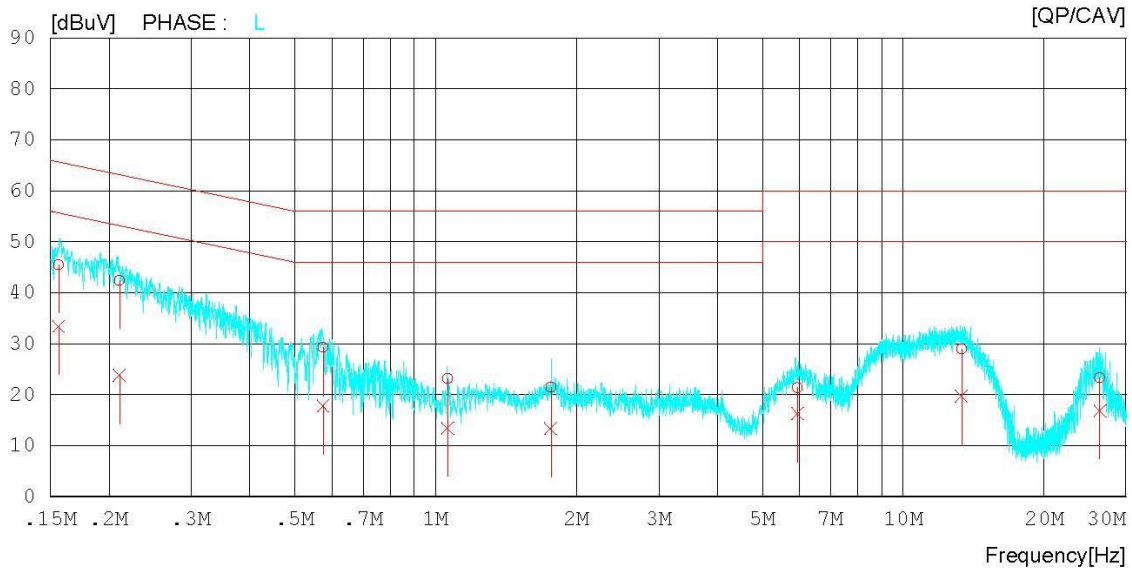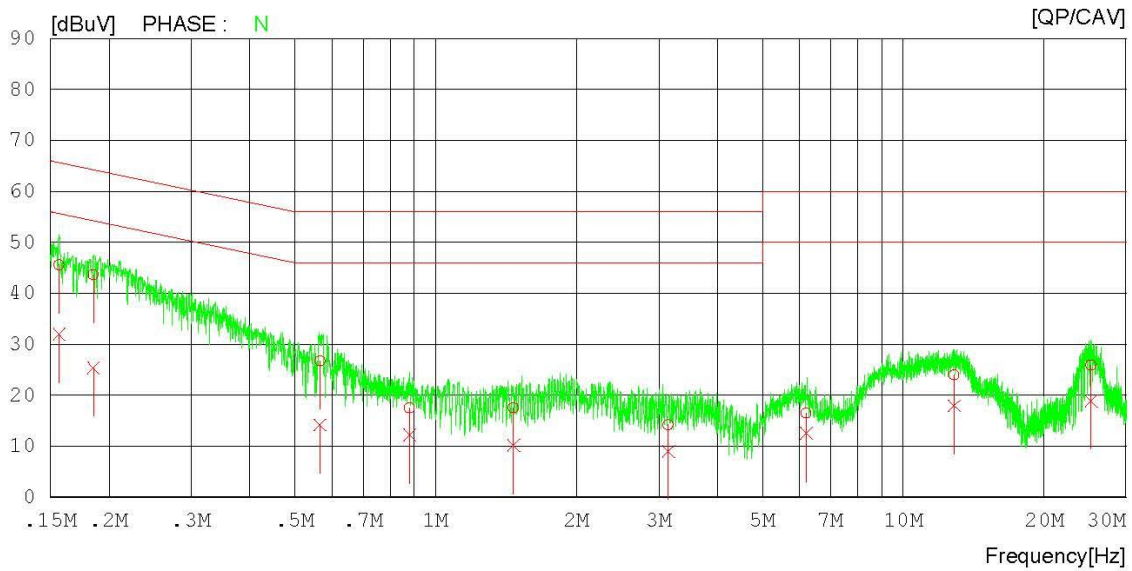DTNC   Date 2020-01-17

Order No.   Referrence No.
Model No.   LM-V601V   Power Supply   120 V, 60 Hz
Serial No.   Temp/Humi.   23 'C / 35 %
Test Condition   5.7G WLAN   Operator   J. W. Kim

Memo

LIMIT : FCC P15.207 QP
        FCC P15.207 AV

Dt&C

AC Line Conducted Emissions (Data List)

Test Mode: U-NII 3　&　802.11a　&　5785 MHz

Results of Conducted Emission

DTNC   Date 2020-01-17

Order No.	Referrence No.	
Model No.	LM-V601V	Power Supply	120 V, 60 Hz
Serial No.		Temp/Humi.	23 'C / 35 %
Test Condition	5.7G WLAN	Operator	J. W. Kim

Memo

LIMIT : FCC P15.207 QP
　　　　　FCC P15.207 AV

NO	FREQ	READING		C.FACTOR	RESULT		LIMIT		MARGIN		PHASE
		QP	CAV		QP	CAV	QP	CAV	QP	CAV	
	[MHz]	[dBuV]	[dBuV]	[dB]	[dBuV]	[dBuV]	[dBuV]	[dBuV]	[dBuV]	[dBuV]	
1	0.15652	35.60	22.07	9.94	45.54	32.01	65.65	55.65	20.11	23.64	N
2	0.18525	33.75	15.49	9.94	43.69	25.43	64.25	54.25	20.56	28.82	N
3	0.56542	16.82	4.26	9.95	26.77	14.21	56.00	46.00	29.23	31.79	N
4	0.87970	7.53	2.25	9.97	17.50	12.22	56.00	46.00	38.50	33.78	N
5	1.46690	7.54	0.19	9.99	17.53	10.18	56.00	46.00	38.47	35.82	N
6	3.14338	4.11	-1.10	10.07	14.18	8.97	56.00	46.00	41.82	37.03	N
7	6.20058	6.32	2.33	10.20	16.52	12.53	60.00	50.00	43.48	37.47	N
8	12.85742	13.52	7.53	10.43	23.95	17.96	60.00	50.00	36.05	32.04	N
9	25.21681	15.20	8.21	10.66	25.86	18.87	60.00	50.00	34.14	31.13	N
10	0.15607	35.50	23.44	9.94	45.44	33.38	65.67	55.67	20.23	22.29	L
11	0.21044	32.42	13.81	9.94	42.36	23.75	63.19	53.19	20.83	29.44	L
12	0.57436	19.27	7.75	9.95	29.22	17.70	56.00	46.00	26.78	28.30	L
13	1.06005	13.17	3.47	9.97	23.14	13.44	56.00	46.00	32.86	32.56	L
14	1.76234	11.37	3.25	10.02	21.39	13.27	56.00	46.00	34.61	32.73	L
15	5.93886	11.14	6.04	10.18	21.32	16.23	60.00	50.00	38.68	33.78	L
16	13.32496	18.54	9.28	10.42	28.96	19.70	60.00	50.00	31.04	30.30	L
17	26.31440	12.62	6.16	10.65	23.27	16.81	60.00	50.00	36.73	33.19	L

9. LIST OF TEST EQUIPMENT

| Type	Manufacturer	Model	Cal.Date (yy/mm/dd)	Next.Cal.Date (yy/mm/dd)	S/N
Spectrum Analyzer	Agilent Technologies	N9020A	19/12/18	20/12/18	MY50410357
Spectrum Analyzer	Agilent Technologies	N9020A	19/12/16	20/12/16	MY48011700
Spectrum Analyzer	Agilent Technologies	N9020A	19/12/19	20/12/19	MY46471251
Spectrum Analyzer	Agilent Technologies	N9030A	19/03/15	20/03/15	MY53310140
DC Power Supply	Agilent Technologies	66332A	19/06/25	20/06/25	MY43001173
Multimeter	FLUKE	17B	19/12/16	20/12/16	26030065WS
Signal Generator	Rohde Schwarz	SMBV100A	19/12/16	20/12/16	255571
Signal Generator	ANRITSU	MG3695C	19/12/16	20/12/16	173501
Thermohygrometer	BODYCOM	BJ5478	19/12/18	20/12/18	120612-1
Thermohygrometer	BODYCOM	BJ5478	19/12/18	20/12/18	120612-2
Thermohygrometer	BODYCOM	BJ5478	19/07/03	20/07/03	N/A
HYGROMETER	TESTO	608-H1	19/01/31	20/01/31	34862883
Loop Antenna	ETS-Lindgren	6502	19/09/18	21/09/18	00226186
BILOG ANTENNA	Schwarzbeck	VULB 9160	19/04/23	21/04/23	9160-3362
Horn Antenna	ETS-Lindgren	3115	19/01/11	21/01/11	9202-3820
Horn Antenna	A.H.Systems Inc.	SAS-574	19/07/03	21/07/03	155
PreAmplifier	tsj	MLA-0118-B01-40	19/12/16	20/12/16	1852267
PreAmplifier	tsj	MLA-1840-J02-45	19/06/27	20/06/27	16966-10728
PreAmplifier	H.P	8447D	19/12/16	20/12/16	2944A07774
Attenuator	Aeroflex/Weinschel	20515	19/06/27	20/06/27	Y2370
Attenuator	SMAJK	SMAJK-2-3	19/06/27	20/06/27	2
Attenuator	SRTechnology	F01-B0606-01	19/06/27	20/06/27	13092403
Attenuator	Hefei Shunze	SS5T2.92-10-40	19/06/27	20/06/27	16012202
Attenuator	SMAJK	SMAJK-50-10	19/08/07	20/08/07	15081901
High Pass Filter	Wainwright Instruments	WHNX8.0/26.5-6SS	19/06/27	20/06/27	3
High Pass Filter	Wainwright Instruments	WHKX12-935-1000-15000-40SS	19/06/26	20/06/26	8
High Pass Filter	Wainwright Instruments	WHKX10-2838-3300-18000-60SS	19/06/26	20/06/26	1
Power Meter & Wide Bandwidth Sensor	Anritsu	ML2496A MA2411B	19/12/16	20/12/16	1338004 1306053
EMI Receiver	ROHDE&SCHWARZ	ESW44	19/07/30	20/07/30	101645
EMI Test Receiver	Rohde Schwarz	ESCI7	19/01/30	20/01/30	100910
			20/01/20	21/01/20	
PULSE LIMITER	Rohde Schwarz	ESH3-Z2	19/09/17	20/09/17	101333
LISN	SCHWARZBECK	NNLK 8121	19/03/19	20/03/19	06183
Cable	Junkosha	MWX241	19/01/14	20/01/14	G-04
			20/01/13	21/01/13	
Cable	Junkosha	MWX241	19/01/14	20/01/14	G-07
			20/01/13	21/01/13	
Cable	DT&C	Cable	19/01/14	20/01/14	G-13
			20/01/13	21/01/13	
Cable	DT&C	Cable	19/01/14	20/01/14	G-14
			20/01/13	21/01/13	
Cable	HUBER+SUHNER	SUCOFLEX 104	19/01/14	20/01/14	G-15
			20/01/13	21/01/13	
Cable	Radiall	TESTPRO3	19/01/16	20/01/16	M-01
			20/01/16	21/01/16	
Cable	Junkosha	MWX315	19/01/16	20/01/16	M-05
			20/01/16	21/01/16	
Cable	Junkosha	MWX221	19/01/16	20/01/16	M-06
			20/01/16	21/01/16	
Cable	DT&C	Cable	19/01/16	20/01/16	RF-82
			20/01/16	21/01/16	

Note1: The measurement antennas were calibrated in accordance to the requirements of ANSI C63.5-2017
Note2: The cable is not a regular calibration item, so it has been calibrated by DT & C itself.
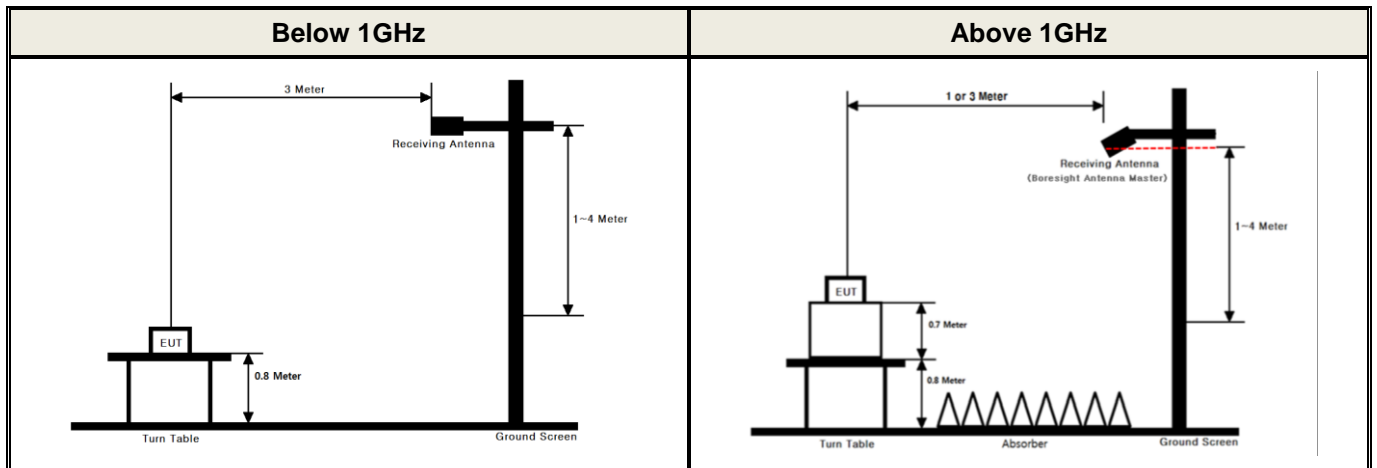
APPENDIX I

Test set up Diagram

▪ **Conducted Measurement**
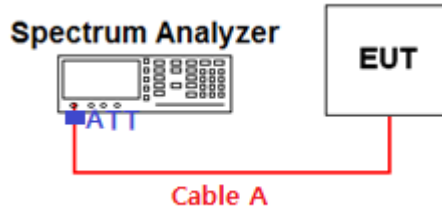
▪ **Radiated Measurement**

Below 1GHz	Above 1GHz

APPENDIX II

Duty Cycle Information

▣ **Test Procedure**

Duty Cycle [X = On Time / (On + Off time)] is measured using Measurement Procedure **of KDB789033 D02v02r01**

1. Set the center frequency of the spectrum analyzer to the center frequency of the transmission.
2. Set RBW ≥ EBW if possible; otherwise, set RBW to the largest available value.
3. Set VBW ≥ RBW. Set detector = peak.
4. Note : The zero-span measurement method shall not be used unless both **RBW and VBW are > 50/T**, where T is defined in section II.B.1.a), and **the number of sweep points across duration T exceeds 100**. (For example, if VBW and/or RBW are limited to 3 MHz, then the zero-span method of measuring duty cycle shall not be used if T ≤ 16.7 microseconds.)

   T : The minimum transmission duration over which the transmitter is on and is transmitting
     at its maximum power control level for the tested mode of operation.
     (**T = On time** of the above table since the EUT operates with above fixed Duty Cycle and it is the
       minimum On time)

▣ **Test Results:**

Duty cycle

Mode	Data Rate	Tested Frequency [MHz]	Maximum Achievable Duty Cycle (x) = On / (On+Off)			Duty Cycle Correction Factor [dB]	50/T [kHz]
			On Time [ms]	(On+Off) Time [ms]	x		
802.11a	6Mbps	5180	2.050	2.090	0.9809	0.08	24.39
802.11n (HT20)	MCS0	5180	5.400	5.460	0.9890	0.05	9.26
802.11n (HT40)	MCS0	5190	5.408	5.458	0.9908	0.04	9.25
802.11ac (VHT80)	MCS0	5210	5.408	5.458	0.9908	0.04	9.25

Single Transmit

Duty Cycle   Test Mode: 802.11a   &   Ch.36
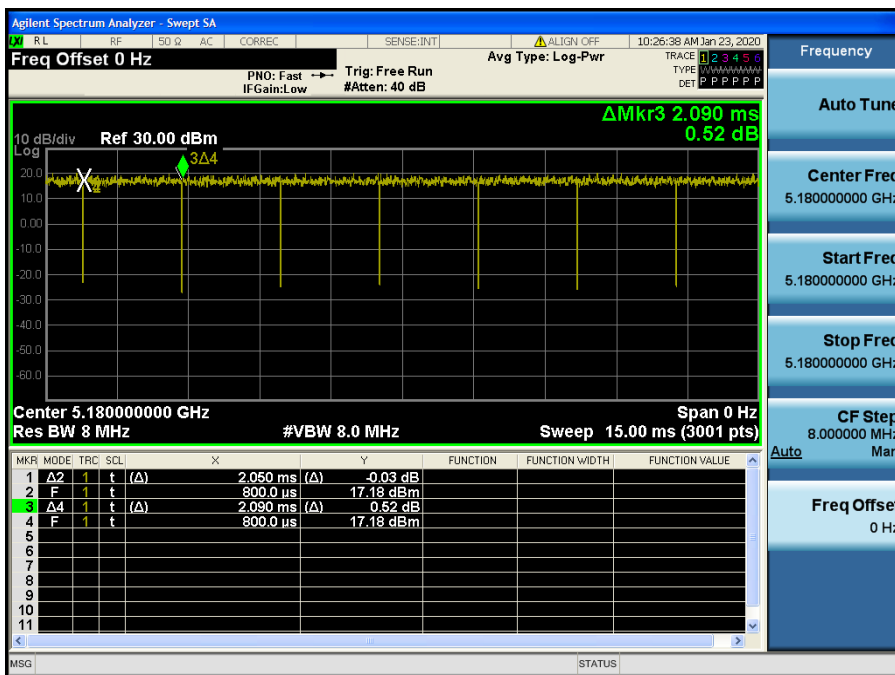
Duty Cycle   Test Mode: 802.11n HT20   &   Ch.36
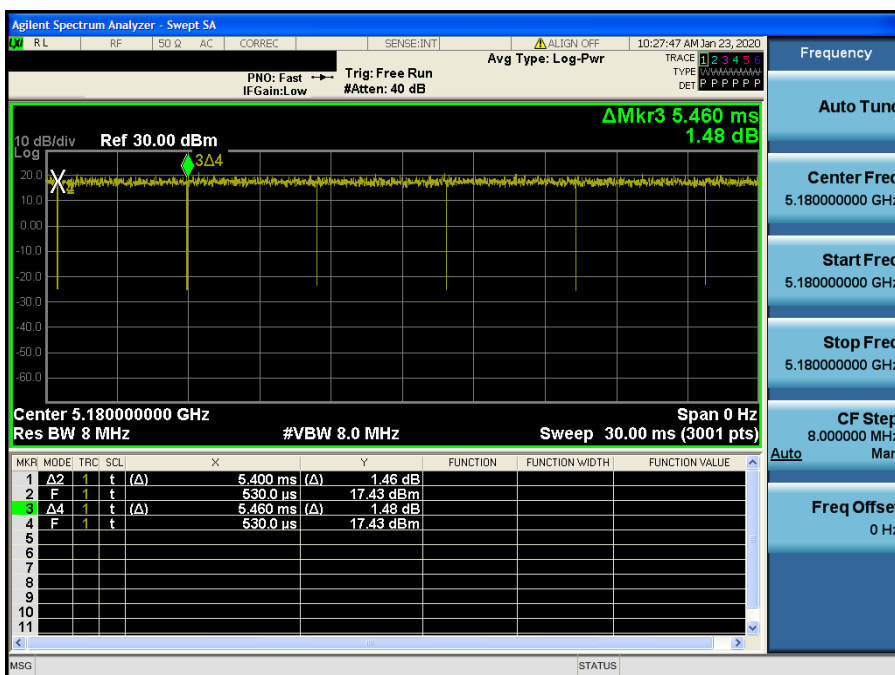
Duty Cycle   Test Mode: 802.11n HT40   &   Ch.38
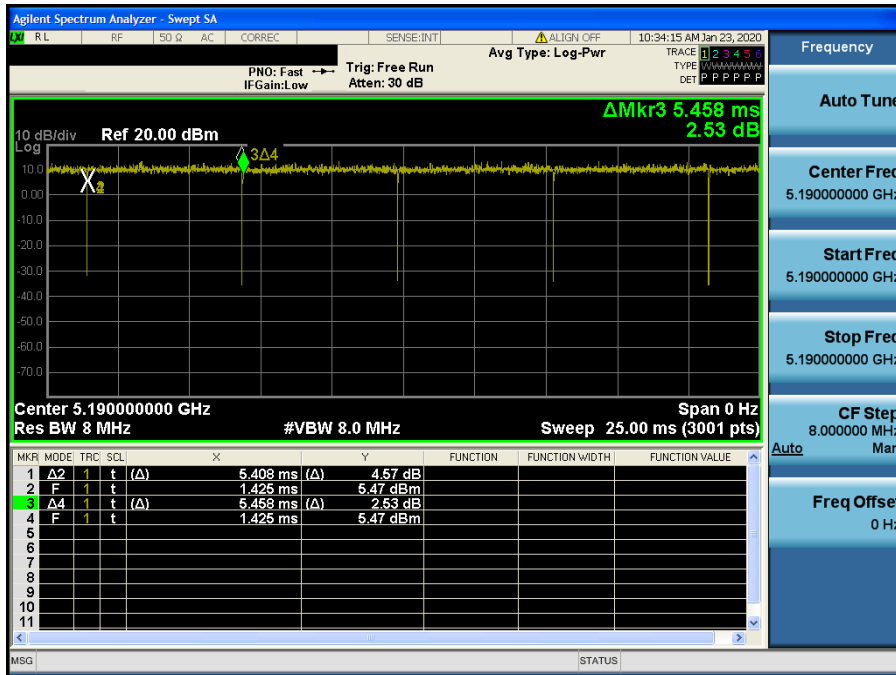
Duty Cycle   Test Mode: 802.11ac VHT80   &   Ch.42
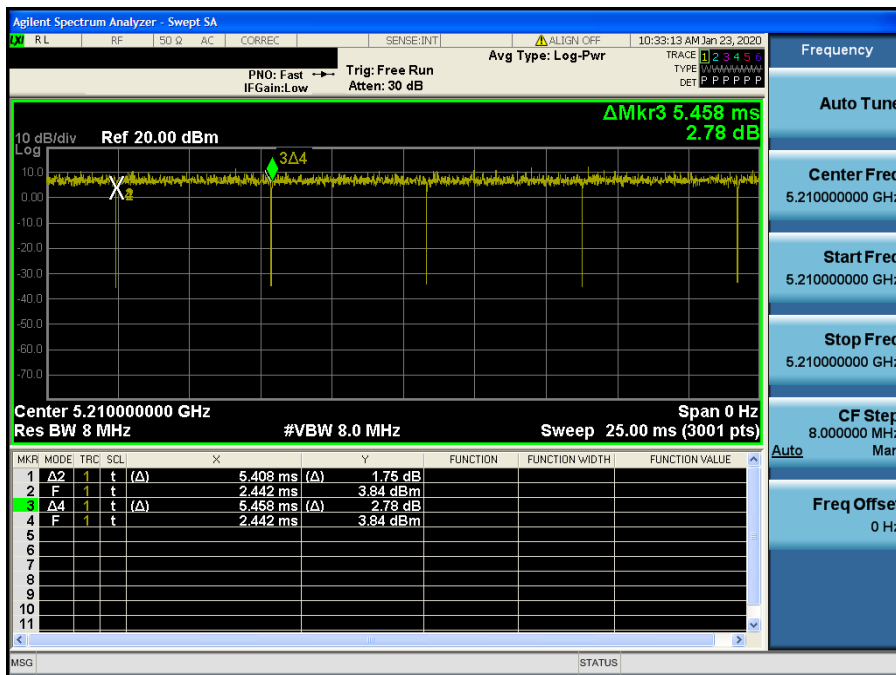
APPENDIX III

Unwanted Emissions (Radiated) Test Plot

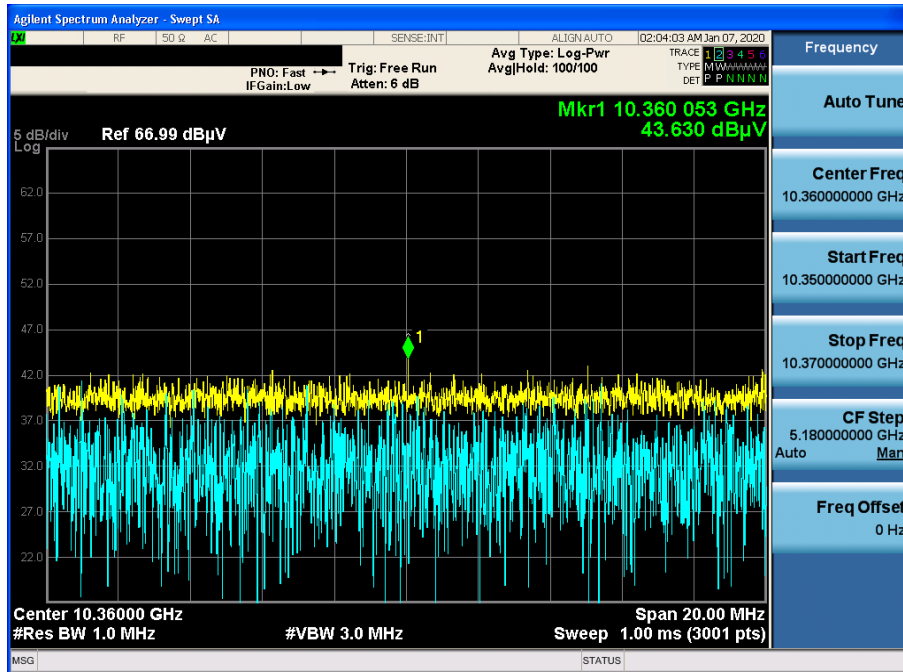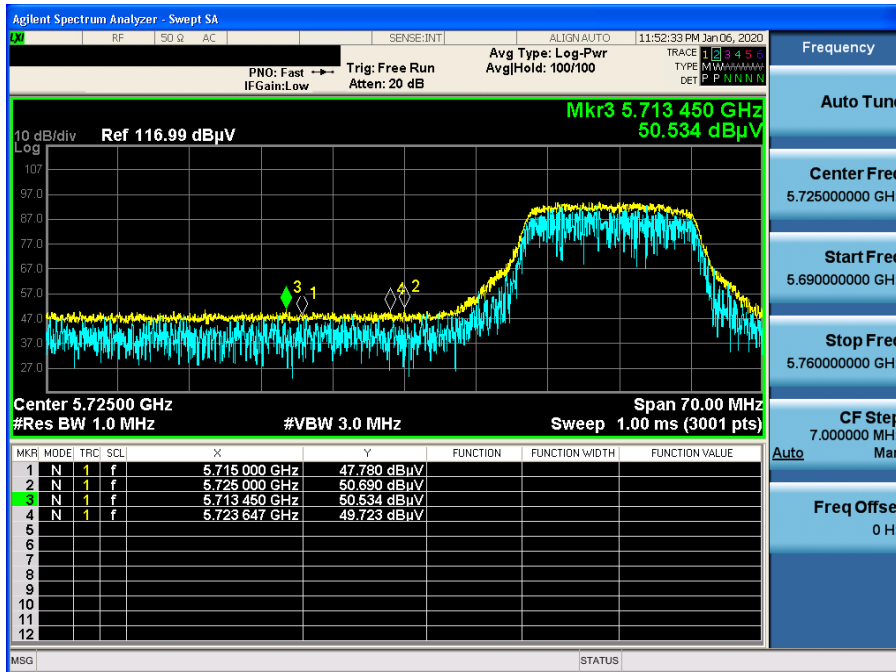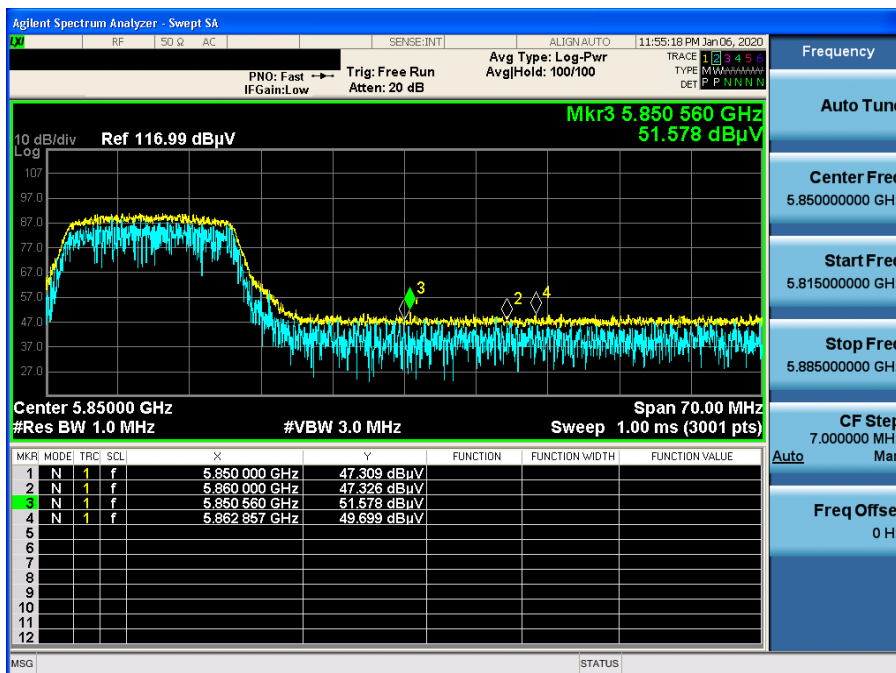### 802.11a & U-NII 1 & Ch.36 & X axis & Ver   Detector Mode : PK

802.11a & U-NII 1 & Ch.36 & X axis & Ver   Detector Mode : AV

Dt&C
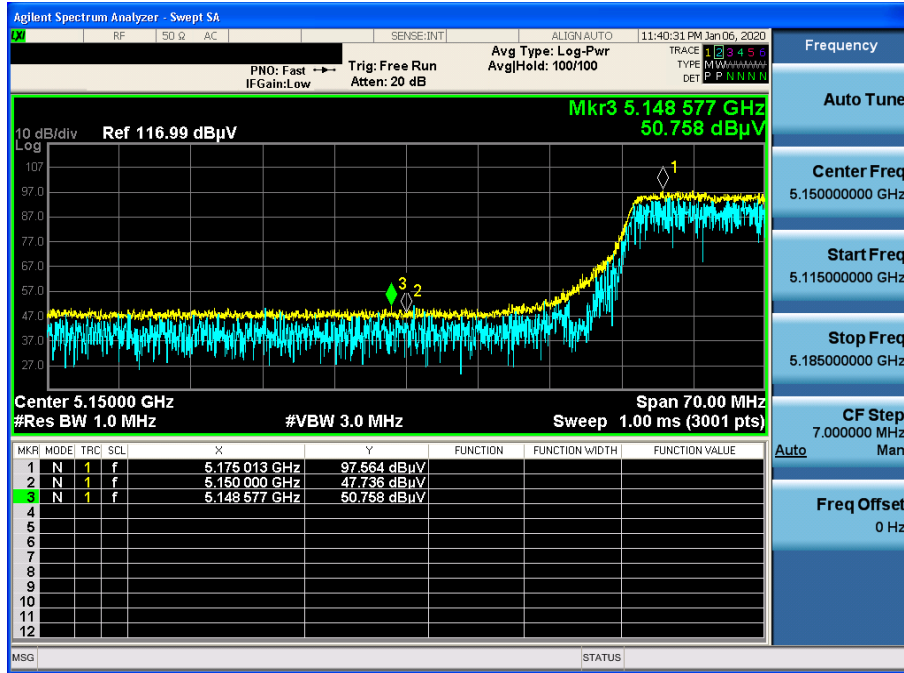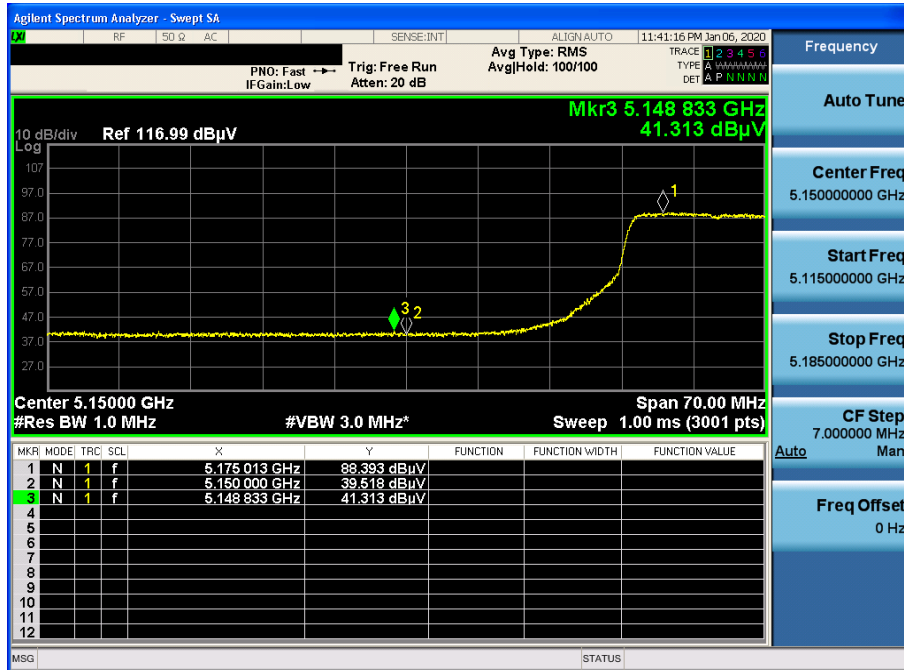
802.11a & U-NII 1 & Ch.36 & Y axis & Ver   **Detector Mode : PK**

802.11a & U-NII 2A & Ch.64 & X axis & Ver   **Detector Mode : PK**
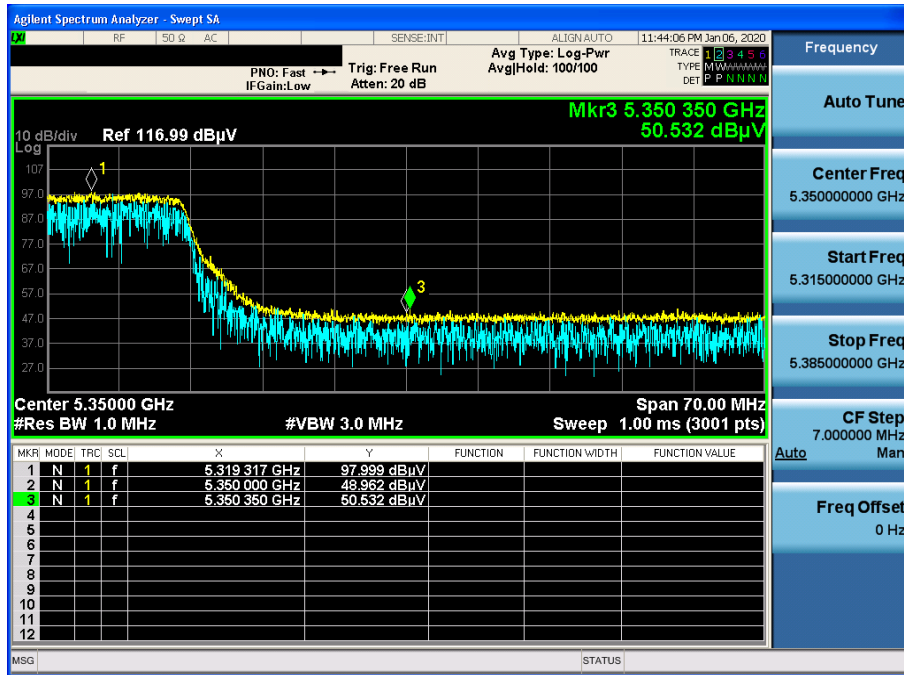
802.11a & U-NII 2A & Ch.64 & X axis & Ver   **Detector Mode : AV**
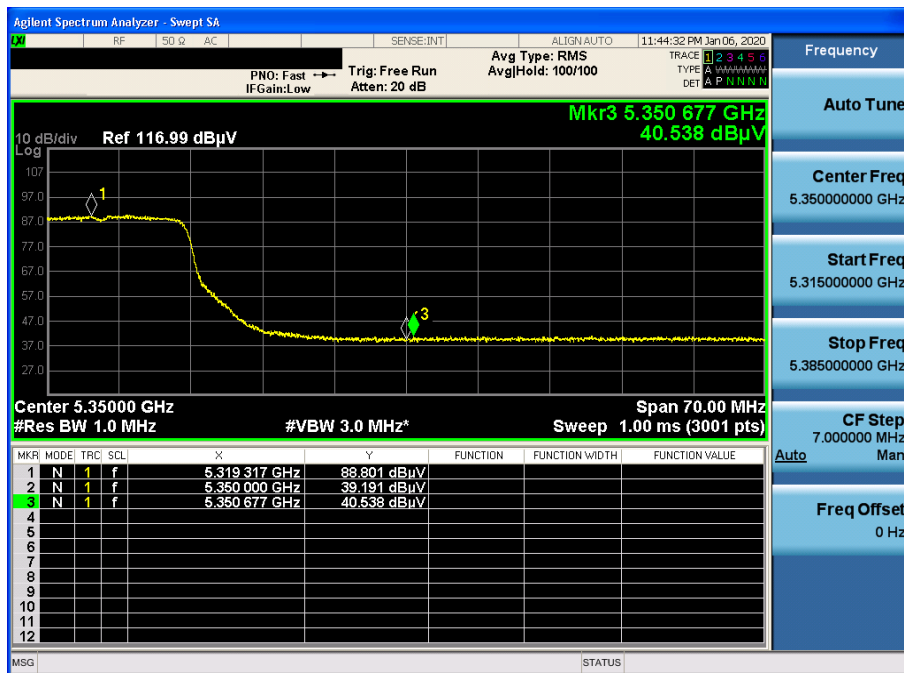
802.11a & U-NII 2A & Ch.60 & Z axis & Ver　　　　　**Detector Mode : AV**
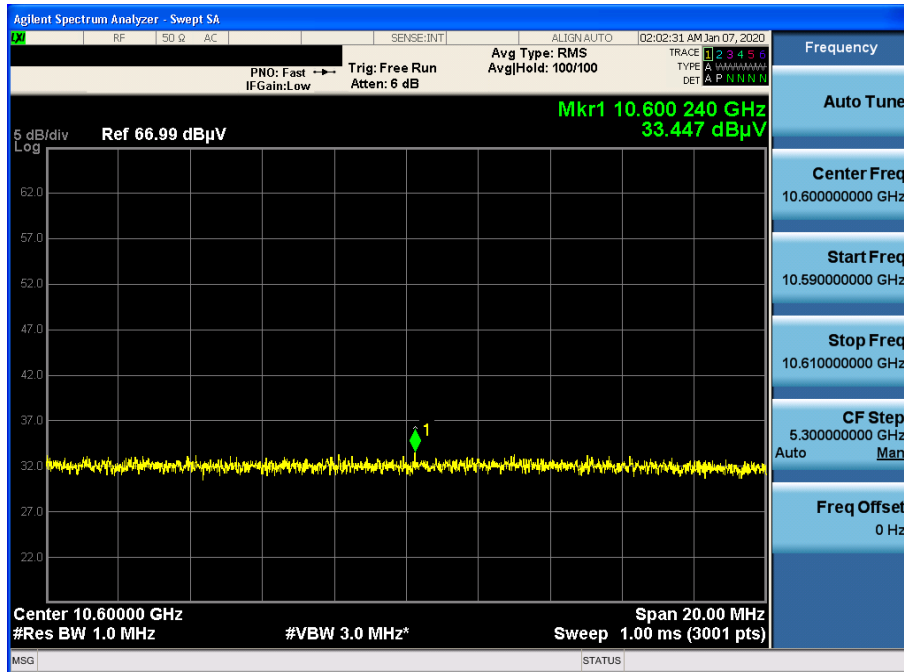
802.11a   &   U-NII 2C   &   Ch.100   &   Z axis   &   Ver   **Detector Mode : PK**
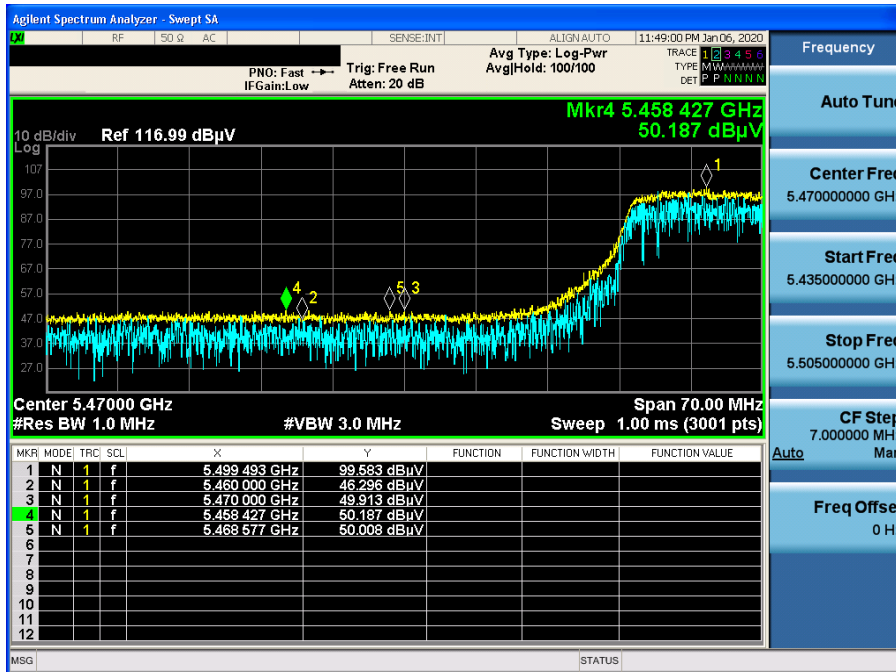
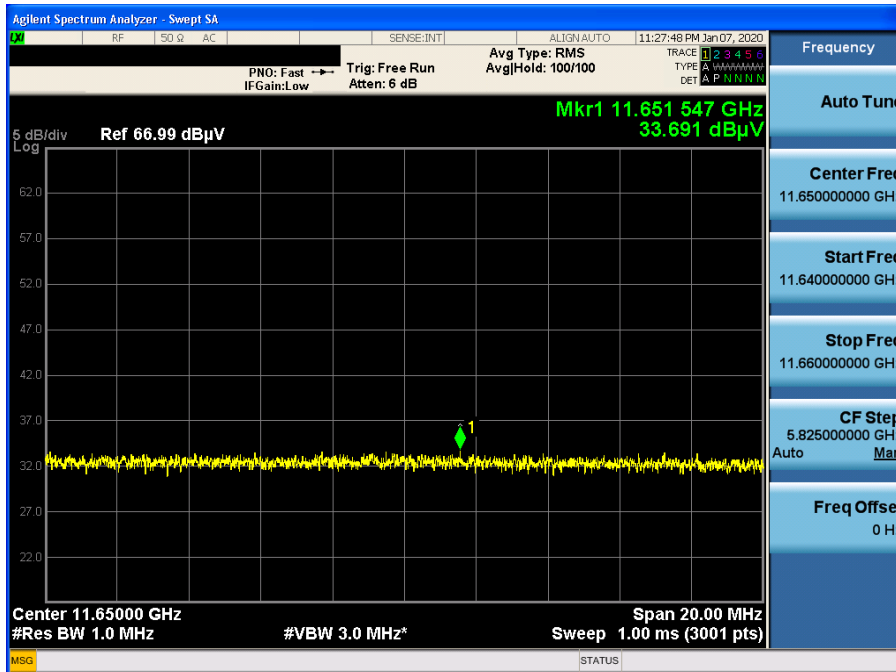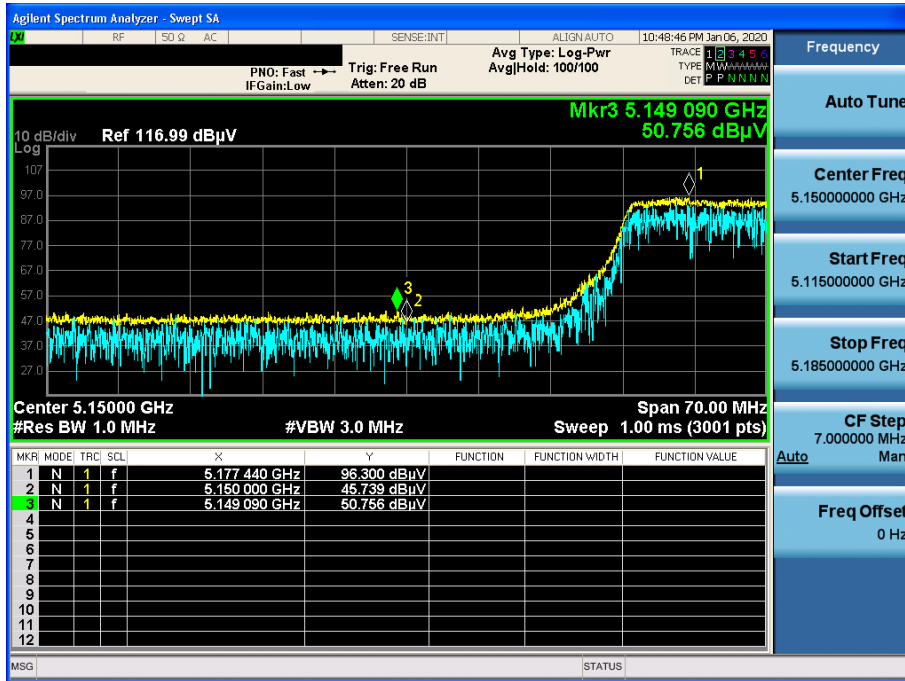**802.11a   &   U-NII 2C   &   Ch.100   &   Z axis   &   Ver**   **Detector Mode : AV**
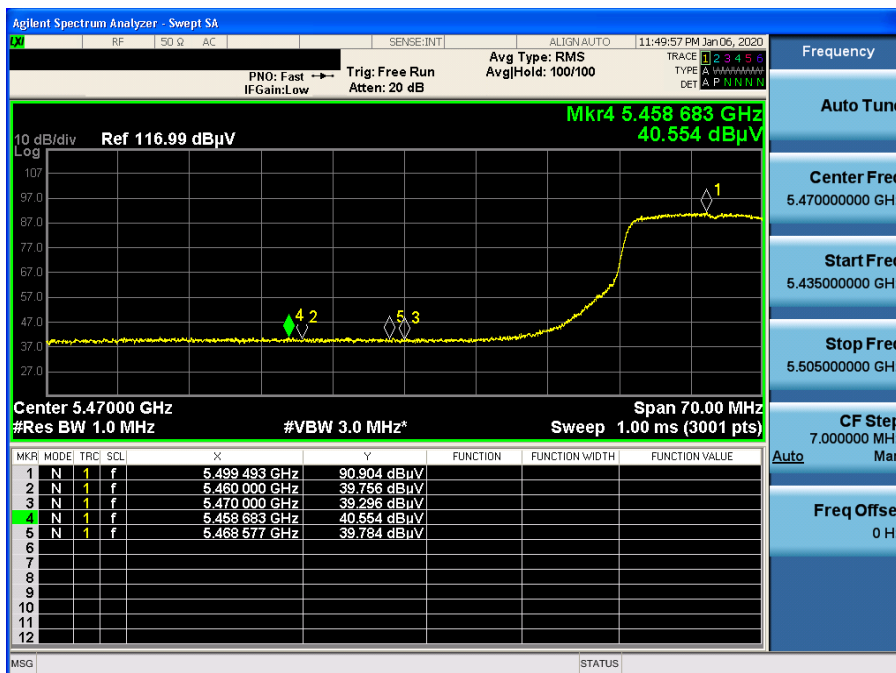
802.11a & U-NII 2C & Ch.120 & Y axis & Ver   Detector Mode : AV
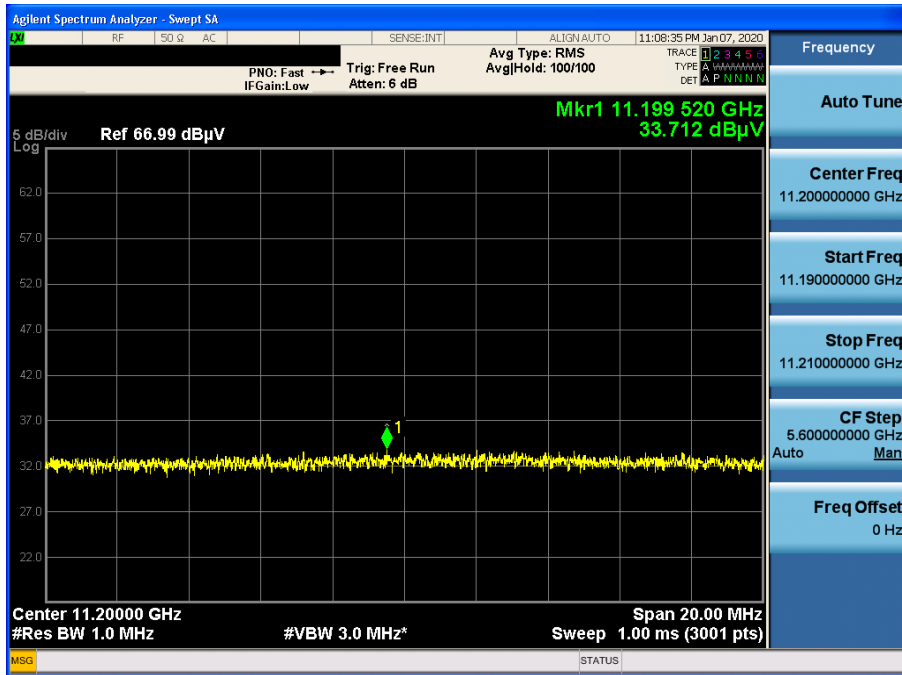
802.11a & U-NII 3 & Ch.149 & X axis & Ver   **Detector Mode : PK**

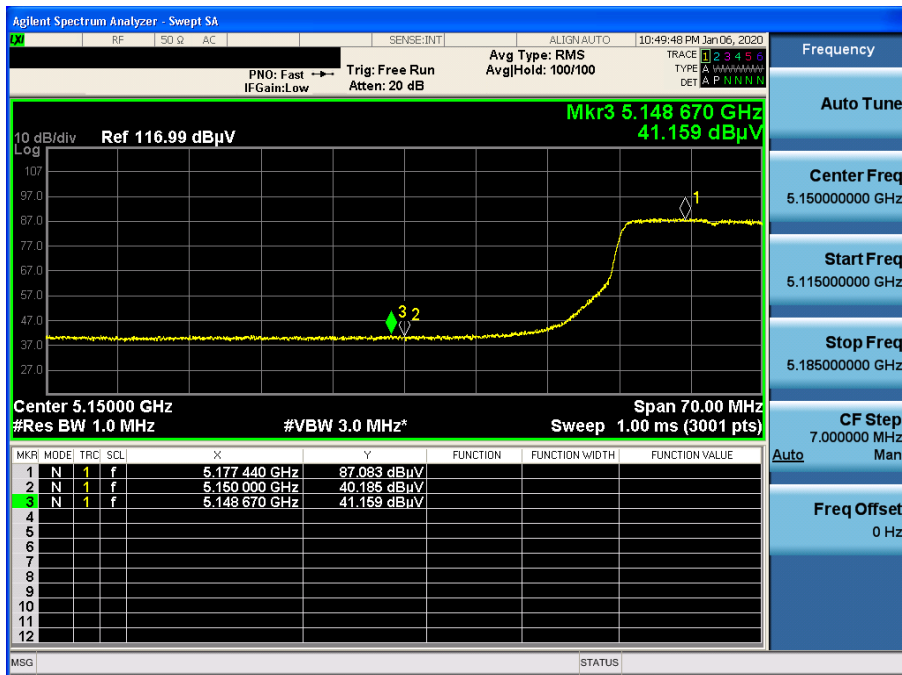**802.11a & U-NII 3 & Ch.165 & X axis & Ver**   **Detector Mode : PK**

Dt&C

802.11a & U-NII 3 & Ch.165 & Y axis & Ver　　　　　　　**Detector Mode : AV**

802.11n(HT20)   &   U-NII 1   &   Ch.36   &   X axis   &   Ver   **Detector Mode : PK**
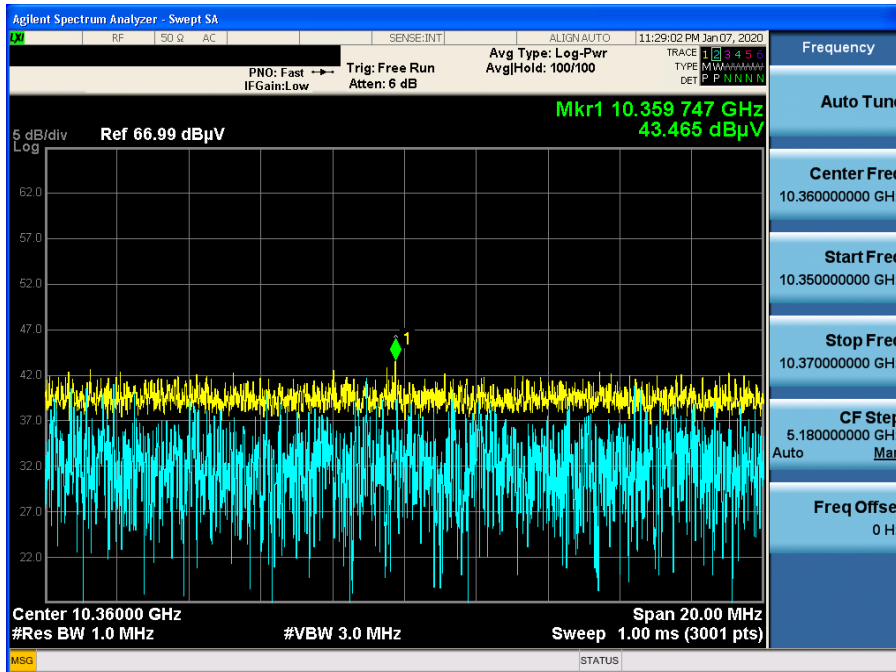

802.11n(HT20)   &   U-NII 1   &   Ch.36   &   X axis   &   Ver   **Detector Mode : AV**

802.11n(HT20)   &   U-NII 1   &   Ch.36   &   Y axis   &   Ver   **Detector Mode : PK**

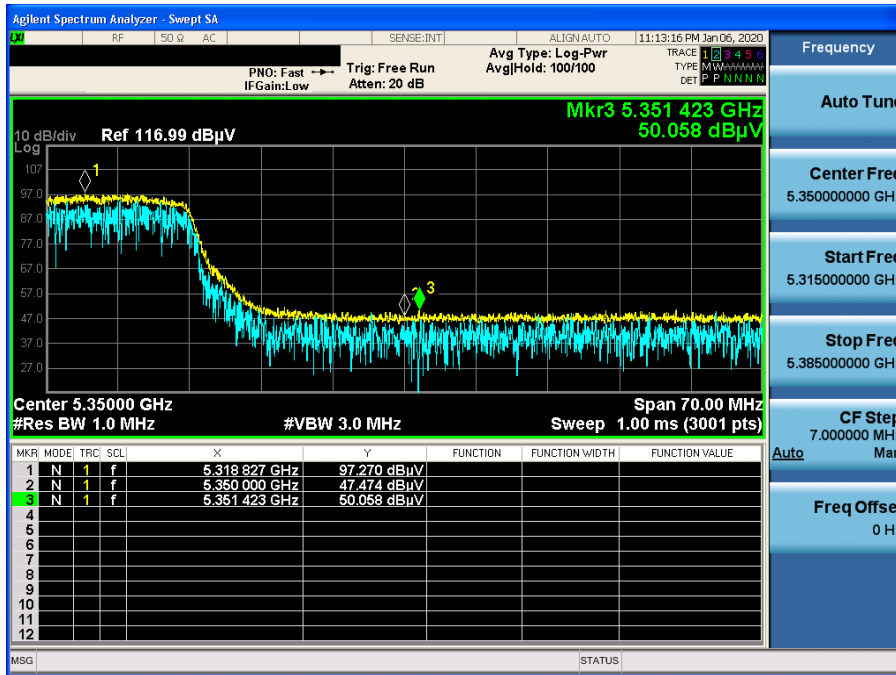## 802.11n(HT20) & U-NII 2A & Ch.64 & X axis & Ver   Detector Mode : PK

802.11n(HT20) & U-NII 2A & Ch.64 & X axis & Ver   Detector Mode : AV